

SAGEBRUSH GIMBAL FOR NEEDLE BIOPSY



● *The Roto-Lok rotary drive helped Fischer Imaging make a better needle biopsy device.*

BMDO HISTORY

Sagebrush Technology Inc. (Albuquerque, NM) developed a novel rotary drive system to precisely position laser beam transmitters and receivers in a communications network. The device, called the Roto-Lok[®] rotary drive, has both military and commercial applications in the angular positioning of mechanical components. The Roto-Lok rotary drive was originally designed

to control large, heavy astronomical tele-

scopes. The BMDO Laser Communications

(LaserCom) program, however, provided

key support to develop the drive into a high-

visibility product. In the LaserCom project,

Sagebrush used the Roto-Lok drive to control

the precision angular alignment of laser

beam transmitters and receivers in a com-

munications network. The drive also served

to position a telescope on BMDO's High Altitude Balloon Experiment.

Fischer Imaging (Denver, CO) recently acquired a Roto-Lok drive to improve the accuracy of its needle biopsy guidance system, used to sample breast tissue. This adaptation has allowed Fischer engineers to provide accurate, smooth needle delivery to the region of concern.

HOW IT WORKS

The drive uses spring-loaded cables to accurately turn a cylinder (drum) that positions the equipment. The cables are wound around the drive motor shaft (a capstan) and attached by a spring at one end to the drum. As the capstan turns, friction from the cables forces rotation of the drum and the components mounted on it. The tensioned cables provide high torsional stiffness without backlash (a design problem in precision gears that reduces pointing accuracy and transmission efficiency). They also provide smooth operation. Because the cables do not slide on the drum or capstan, there is virtually no wear. Any imperfections on a single cable or on the drum are averaged over the multiple cables, so the drive is extremely smooth. In addition, performance does not degrade with use. The drive can position the drum to within 1 microradian of arc. Further, it transmits rotation at efficiency rates greater than 98 percent and runs more quietly than any other mechanical transmission system.

MEDICAL SIGNIFICANCE

Roto-Lok drives are now lending precision and reliability to Fischer Imaging's specialized needle biopsy driver. The device is a semiautomated ultrasound imager that displays the breast lesion and helps to position a needle for minimally invasive breast biopsy. The Roto-Lok drive enables the physician to aim and deliver the needle with great accuracy and smooth motion, which are of utmost importance in any biopsy. In addition, the driver's performance does not degrade with repeated procedures, significantly reducing overall maintenance. The simpler mechanics of the drive also allow for improved housing so that the unit is easier to manipulate and sterilize between procedures.

When a mammogram or self-exam reveals a suspicious area, needle biopsy is the least invasive way to sample the region of concern and yield a core of tissue for a histopathological examination. If the sample is positive for cancer, then mastectomy or breast-conserving lumpectomy may be performed, with adjuvant therapy. If the sample is negative, then the patient will have avoided more painful, costly, and cosmetically unsatisfactory surgical biopsy.

VENTURES OR PRODUCT AVAILABILITY

Sagebrush currently custom-designs Roto-Lok drives for a variety of applications. Sagebrush has received several patents for the Roto-Lok drive. Patent applications also have been filed. At present, Fischer is finishing its adaptation of the Roto-Lok drive into its needle biopsy unit.

CONTACT

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